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A PREFERRED ORDER FOR STUDYING CURRENT PROBLEMS IN MINNESOTA'S TRADE AND TECHNICAL PROGRAM.

BY- MOSS, JEROME, JR.
MINNESOTA STATE DEPT. OF EDUCATION, ST.PAUL

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THE STUDY WAS CONDUCTED TO OBTAIN A CURRENT PRIORITY OF PROBLEMS IN TRADE AND TECHNICAL EDUCATION IN MINNESOTA SUITABLE FOR GUIDING POTENTIAL INVESTIGATORS IN PROBLEM SELECTION AND FOR ASSISTING THE STATE IN DETERMINING ITS ALLOCATION OF RESOURCES FOR RESEARCH. A CONFERENCE OF DIRECTORS AND ASSISTANT DIRECTORS FROM 15 AREA VOCATIONAL SCHOOLS, THE TOTAL TRADE AND TECHNICAL TEACHER TRAINING STAFF, THE DIRECTOR AND ASSISTANT DIRECTOR OF VOCATIONAL EDUCATION, AND THE STATE SUPERVISORS IN THIS AND RELATED AREAS DEVELOPED A LIST OF PROBLEMS WHICH APPEARED TO BE LIMITING THE EFFECTIVENESS OF THE STATE'S PROGRAM. THESE PROBLEMS WERE REPHRASED AND INCORPORATED IN AN OPINIONNAIRE CONTAINING 18 PROBLEM AREAS. THE OPINIONNAIRES WERE SENT TO THE ABOVE GROUPS WITH THE REQUEST TO RANK EACH PROBLEM IN THE ORDER IN WHICH IT SHOULD BE STUDIED. THE PROBLEMS WERE GROUPED IN EIGHT AREAS. IT WAS CONCLUDED THAT--(1) THE QUESTIONS REFLECT MOST OF THE CURRENT PROBLEMS, (2) THERE IS LITTLE AGREEMENT ON PREFERRED ORDER, (3) THE PROBLEM AREAS IDENTIFIED FOR TRADE AND TECHNICAL EDUCATION ARE RELEVANT TO THE FIELDS OF AGRICULTURE, BUSINESS, AND DISTRIBUTIVE EDUCATION, BUT NOT TO HOME ECONOMICS EDUCATION, AND (4) IN SIMILAR STUDIES MICHIGAN AND PENNSYLVANIA IDENTIFIED MOST OF THE COMMON PROBLEM AREAS AND ALSO RECOGNIZED PROBLEMS FOR WHICH MINNESOTA HAD NO COUNTERPARTS. (PA)

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by

Jerome Moss, Jr.

Department of Industrial Education

University of Minnesota

Vocational Section

Minnesota State Department of Education

St. Paul, Minnesota

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FOREWORD

One result of the implementation of the Area Redevelopment Act and the Manpower Development and Training Act is to increase the administrative burden in the area vocational-technical schools of Minnesota.

Vocational education services have always attempted to be immediately responsive to industrial change, increasing population, re-location of people at work and to occupational demand.

Now the Vocational Education Act of 1963, P.L. 88-210, has increased the impact of P.L. 88-27 and of P.L. 87-415; administrative responsibilities must cover a greater range. The need for research, fundamental to the development of plans and programs, is immediately apparent.

It was with this in mind that the cooperation of the University of Minnesota was requested to determine those problems currently affecting the area vocational-technical schools of the state. Many of such problems are identified in this report.

Vocational Section
State Department of Education
State of Minnesota

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I. THE PROBLEM

The recently increased financial support for vocational education, a heightened awareness of the number and acuteness of extant problems, and a growing belief in the value of formalized problem-solving procedures have combined to provide unprecedented opportunities and obligations for research in all areas of vocational education.

This study has been designed to supply information useful in planning a sustained program of research in one such area. Its major purpose is to obtain a current priority of significant problems in public vocational trade and technical education in Minnesota suitable for guiding potential investigators in problem selection, and for assisting the State in determining its allocation of resources for research.

More specifically, the following questions are posed:

1. In the opinion of vocational educators who are most familiar with the statewide program of public trade and technical education, and who are in a position to encourage, direct, and/or support research,
   a. What problem areas[1] appear to be limiting the effectiveness of the trade and technical program in the State?
   b. What is the preferred order in which these problem areas should be studied?
2. When vocational educators who are most familiar with the statewide program of trade and technical education are organized into categories of area school administrators, teacher trainers, and State Department personnel,
   a. What is the preferred order in which each of these categories feels the problem areas should be studied?
   b. To what extent do these categories agree upon the preferred order in which the problem areas should be investigated?
3. To what extent do vocational educators with specific statewide responsibility for agriculture, business, distributive, and home economics education agree with their colleagues in trade and technical education on the preferred order in which the problem areas should be studied?
4. When the principal findings of this study are compared with those of similar studies in Michigan and Pennsylvania,[2]
   a. What common problem areas have been identified?
   b. To what extent are the priorities assigned to common problem areas in each of the other studies in agreement with the priority found in this study.

II. PROCEDURES

Sampling. Two purposive samples are utilized. The first sample (n=29), called the "trade and technical" sample, is composed of three subsamples: a) All the directors and assistant directors of the fifteen area vocational schools[3] presently in operation (n=17), b) the total trade and technical teacher training staff (n=6), and c) the Director and Assistant Director of Vocational Education, the State Supervisor of Manpower Training,

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[1] Problem areas are not necessarily researchable in their present form, but they do represent areas from which specific research problems can be developed.

[2] Advisory Committee for Research Project on Organization, Administration and Supervision of Vocational Education, "Research Problems", Ann Arbor, Mich., Department of Vocational Education and Practical Arts, University of Michigan, n.d., 3p. (mimeographed).

State Research Advisory Committee, Trade and Industrial Education, *As You See It,* Harrisburg, Pa., Pennsylvania Department of Public Instruction, 1960, 4p.

[3] The area schools enroll over 95% of the trade and technical students in the State; conversely, they enroll less than 4% of the students in agriculture, business, distributive, and home economics programs.

the State Supervisor of Trade and Industrial Education, and the two Assistant State Supervisors of Trade and Industrial Education (n=6).

The second sample (n=8), called the "related vocational fields" sample, consists of the four head teacher trainers and the four State Supervisors of Agriculture, Business, Distributive, and Home Economics Education.

Data Collection. Ninety-eight percent (n=28) of the trade and technical sample and 38% (n=3) of the related vocational fields sample attended a conference designed to develop a list of problems which appear to be limiting the effectiveness of the trade and technical program in the State. No reference was made to lists of problems developed in Michigan or Pennsylvania.

The problems suggested during the conference were rephrased and incorporated in an opinionnaire containing eighteen problem areas[4]. The opinionnaire, together with an explanatory cover letter, was then sent[5] to both samples with instructions to ". . . indicate your opinion of the relative importance of each problem listed below by ranking them in the consecutive order in which you feel they should be studied. The rank of one (1) represents the highest priority. Use the space at the bottom of the list to add significant problems that are not shown and include these additions in your ranking." Replies were received from 98% (n=28) of the trade and technical sample and 100% of the related vocational fields sample.

Treatment of Data. To determine the consistency with which an individual might be expected to rank eighteen items, the opinionnaire was administered three times to five members of the trade and technical sample, using intervals of three days and forty-five days. The respondents did not know they would be retested. Spearman rank order correlations were calculated. Table 1 presents the results.

Table 1.
TEST-RETEST COEFFICIENTS OF RELIABILITY OF THE OPINIONNAIRE
(Rank order)

Interval	Sample Member 1	2	3	4	5	Average r′ of the Five Members*
3 days	.95	.94	.89	.90	.94	.93
45 days	.86	—.11	.22	.60	.55	.50

*Using z′ transformations.

The ability of the opinionnaire to reflect an individual's current opinion satisfactorily is shown by the high correlations obtained between two administrations given three days apart. On the other hand, the opinionnaire's sensitivity to actual change of individual opinion[6] is reflected in the much lower correlations obtained when consecutive administrations were separated by forty-five days.

Further evidence of the short term stability of the opinionnaire was secured by correlating the average of the five members' ranks for each problem area on one administration with their average ranks on the second administration given three days later; a rank order coefficient of .96 was obtained, indicating the high reliability of the average ranks of the sample.

To find the preferred order in which the problem areas should be studied, the average rank of each problem area was computed for the trade and technical sample, the three

[4] A complete list of the eighteen problem areas is given in Appendix A.

[5] The list of problems was developed prior to, and the opinionnaire was mailed subsequent to, the passage of the Vocational Education Act of 1963.

[6] Because the Vocational Education Act of 1963 was passed during the 45 day interval, the individuals completing the opinionnaire stated that they were conscious of varying amounts of actual change of opinion. For example, the importance of improving the "image" of the field was initially given a top priority by one individual, but after the Act made additional funds available, he felt that the problem should be assigned a very low priority.

subsamples within the trade and technical sample, and the related vocational fields sample. Then, for each sample and subsample, Kendall's Coefficient of Concordance[7] (W) was calculated to determine the degree of agreement among individuals in their rankings of the eighteen problem areas. When a low coefficient was found, indicating little consensus within a sample or subsample on the exact order in which the problem areas should be investigated, the distribution of the eighteen average ranks was inspected to identify relatively homogeneous groupings of average ranks. Priorities of problem areas were then reported in terms of *groups* of problem areas.

To ascertain the extent to which the various samples and subsamples agree upon the preferred order in which to study the problem areas, the average ranks assigned by each sample or subsample to the problem areas were converted to a range of one to eighteen. Spearman rank order coefficients were then calculated between pairs of converted average ranks to find the degree of their relationship.

Separate comparisons of the findings of this study with those reported by Michigan and by Pennsylvania were made by first analyzing the content of problems identified in each study to determine which problems correspond to one or more of Minnesota's eighteen problem areas. When more than one problem from a given study corresponded to a particular Minnesota problem area, the average rank of the individual problems was computed. The average ranks were then converted into ranks representing the priorities of "common" problem areas within each study. Rank order correlations between problem areas common to Minnesota-Michigan and Minnesota-Pennsylvania were calculated.

III. FINDINGS

Question 1a. In the opinion of vocational educators who are most familiar with the statewide program of public trade and technical education, and who are in a position to encourage, direct, and/or support research, what problem areas appear to be limiting the effectiveness of the trade and technical program in the State?

Appendix A and Table 2 contain the list of problem areas considered by thirty-one persons in attendance at the conference to be most significant in limiting the effectiveness of the trade and technical program in the State.

Despite the fact that the list of problem areas was developed prior to the passage of the Vocational Education Act of 1963, and opinions concerning their relative importance were obtained subsequent to the passage of the Act, only three additional problem areas were suggested by the opinionnaire respondents. The suggested problems were concerned with State vs. local control and financing of area schools, the effect of lack of transportation on attendance at area schools, and the operation of high school and post-high school vocational guidance programs. It is not possible to estimate what the relative importance of these problem areas would have been had they been included in the opinionnaire.

Question 1b. What is the preferred order in which these problem areas should be studied?

Table 2 presents the order in which the trade and technical sample feels the problem areas should be investigated.

Weighting the opinion of each member of this sample equally, the degree of agreement among individuals, as measured by the coefficient of concordance, was found to be .17 (significant at the .01 level). Because of the low extent of agreement, indicating a lack of real consensus, priorities are reported by groups of problem areas.

Question 2a. When vocational educators who are most familiar with the statewide program of trade and technical education are organized into categories of area school administrators, teacher trainers, and State Department personnel, what is the preferred order in which each of these categories feel the problem areas should be studied?

[7] $W = \frac{\text{Sum of squares between problems}}{\text{Total sum of squares}}$

Table 2.
PREFERRED ORDER IN WHICH GROUPS OF PROBLEM AREAS SHOULD BE STUDIED: TRADE AND TECHNICAL SAMPLE
(n = 28)

Rank of Groups of Problem Areas	Range of Average Ranks Within Each Group	Problem Areas (Numbered as listed on the opinionnaire)
1	6.5-6.7	5. How can we improve the techniques for identifying the occupations for which training should be provided? 1. How can the high school years be best used to discharge public education's total responsibility for preparing students to enter the world of work?
2	7.2-7.7	2. What responsibility does vocational education have for providing curricula for the "low ability" student and the potential high school drop-out? What can it do for those students? 14. How can we improve the recruitment, selection, training, and updating of vocational instructors? 9. How can we improve our methods of identifying and developing the curriculum and specific course content used to train for a given occupation?
3	8.2-8.9	6. For what operative (semi-skilled) occupations should the schools provide training? At what educational level(s)? How? 15. How can we improve the efficiency and effectiveness of the classroom and shop teaching-learning situation (methods, class size, instructional materials, length of class periods, etc.)? 11. What are the relative merits of the administrative structure and educational opportunities provided by (a) specialized and (b) comprehensive institutions (i.e. area vocational-technical schools vs. community colleges, vocational high schools vs. comprehensive high schools)? 17. What will be the statewide quantitative need for workers in each of the trade and industrial occupations by 1970? In what geographical areas will these needs be centered?
4	9.4-9.9	13. What programs can be devised to recruit, select, and train vocational supervisors, coordinators, and directors? 18. What are the objective measures which will predict student achievement and completion rate in our vocational curricula? 10. What relative emphasis should be placed in preparatory vocational curricula on the attainment of specialized, immediately productive skills versus the development of abilities permitting greater breadth and flexibility in attaining long-range occupational goals?

Table 2 (Continued)

5	10.6-11.3	4. What techniques and procedures are most effective in improving the "image" of vocational and technical education? 3. What is the "image" of vocational and technical education in the minds of its publics (administrators, teachers, students, industry, labor, etc.)? 7. Are there occupations that require combination distributive-trade and industrial programs? How, when and where might these be offered?
6	11.8	12. What evidence can be secured illustrating the relative effectiveness of vocational vs. non-vocational programs (to show the personal and social benefits of vocational programs)?
7	13.4	16. What is the extent of geographical mobility among youth and workers in the State?
8	14.3	8. What specific occupations will emerge from the taconite industry?

Table 3 presents the degree of agreement on priorities of problem areas found *within* each of the three trade and technical subsamples.

Table 3.
DEGREE OF AGREEMENT WITHIN EACH TRADE AND TECHNICAL SUBSAMPLE

Subsample	(W) Coefficient of Concordance	Range of Average Ranks
Area School Administrators (n=17)	.15**	6.9-13.6
Trade and Technical Teacher Trainers (n=5)	.41**	3.0-16.6
Selected State Department Personnel (n=6)	.32*	4.6-14.5

*Significantly different from zero at the .05 level.
**Significantly different from zero at the .01 level.

Although some degree of agreement within each subsample is evident, the coefficients do not appear sufficiently large to warrant the assumption that average opinions represent common points of view. Consequently, Tables 4, 5, and 6 report the priority rankings of each subsample by groups of problem areas. To preserve space, only the number of each problem area has been given.

Question 2b. To what extent do these categories (subsamples) agree upon the preferred order in which the problem areas should be investigated?

Table 7 shows the rank order correlation coefficients of priority rankings of problem areas between pairs of trade and technical subsamples.

Table 4.
PREFERRED ORDER IN WHICH GROUPS OF PROBLEM AREAS SHOULD BE STUDIED:
AREA SCHOOL DIRECTORS AND ASSISTANT DIRECTORS
(n=17)

Rank of Groups of Problem Areas	Range of Average Ranks Within Each Group	Problem Areas*
1	6.9-7.1	2, 5, 14, 9
2	8.3-9.3	1, 15, 11, 17, 6, 18, 4
3	10.2-10.9	13, 10, 7
4	11.5-12.2	3, 12
5	13.0-13.6	16, 8

*Individual problem areas are numbered as they are listed on the opinionnaire. (See Appendix A.)

Table 5.
PREFERRED ORDER IN WHICH GROUPS OF PROBLEM AREAS SHOULD BE STUDIED:
TRADE AND TECHNICAL TEACHER TRAINERS
(n=5)

Rank of Groups of Problem Areas	Range of Average Ranks Within Each Group	Problem Areas*
1	3.0-3.4	5, 1
2	6.1	9
3	7.7-7.9	18, 17, 14
4	8.7-9.2	10, 12, 2, 15
5	10.4	6, 11
6	11.2-12.0	3, 13, 7
7	13.4-13.8	16, 4
8	16.6	8

*Individual problem areas are numbered as they are listed on the opinionnaire. (See Appendix A.)

Table 6.
PREFERRED ORDER IN WHICH GROUPS OF PROBLEM AREAS SHOULD BE STUDIED:
SELECTED STATE DEPARTMENT PERSONNEL
(n=6)

Rank of Groups of Problem Areas	Range of Average Ranks Within Each Group	Problem Areas*
1	4.6-4.7	6, 1
2	5.7-6.3	13, 2
3	7.8-8.7	11, 5, 15, 14
4	9.5-10.5	3, 10, 17, 9
5	11.5-12.0	4, 18, 7
6	13.2	12
7	14.3-14.5	8, 16

*Individual problem areas are numbered as they are listed on the opinionnaire. (See Appendix A.)

Table 7.
CORRELATION COEFFICIENTS OF PRIORITY RANKINGS OF PROBLEM AREAS BETWEEN TRADE AND TECHNICAL SUBSAMPLES

	Trade and Technical Teacher Trainers	Selected State Department Personnel (n=6)
Area School Administrators (n=17)	.68**	.64**
Trade and Technical Teacher Trainers (n=5)		.32

**Significantly different from zero at the .01 level.

Question 3. To what extent do vocational educators with specific statewide responsibility for agriculture, business, distributive, and home economics education agree with their colleagues in trade and technical education on the preferred order in which the problem areas should be studied?

In response to the opinionnaire sent to the related vocational fields sample, the two representatives of home economics education stated that the listed problem areas are *not* relevant to their field; they did not presume to assign ranks to the problem areas.

The remaining six members of the related vocational fields sample had a low, but statistically significant (.05 level), degree of agreement among their individual rankings (W=.28). Consequently, problem areas were grouped on the basis of their average ranks. Table 8 presents this grouping; it signifies the preferred order in which the "delimited" related vocational fields sample (n=6) believes the problem areas should be studied.

Table 8.
PREFERRED ORDER IN WHICH GROUPS OF PROBLEM AREAS SHOULD BE STUDIED:
DELIMITED RELATED VOCATIONAL FIELDS SAMPLE (n=6)

Rank of Groups of Problem Areas	Range of Average Ranks Within Each Group	Problem Areas*
1	5.6- 5.8	14, 10
2	6.8- 7.3	13, 5, 2
3	8.0- 8.8	1, 4, 9, 15, 3, 7
4	10.0-10.5	11, 17, 6
5	11.5	12
6	12.8	18
7	14.5	16
8	17.3	8

*Individual problem areas are numbered as they are listed on the opinionnaire.

When the average ranks assigned to the problem areas by the trade and technical sample and the delimited related vocational fields sample are each converted to a range of one to eighteen, a Spearman rank order correlation between the two sets of converted ranks yields a coefficient of .60 (significant at the .01 level).

Question 4a. When the principal findings of this study are compared with those of similar studies in Michigan and Pennsylvania, what common problem areas have been identified?

The study in Michigan, conducted during 1961–2, attempted to identify and rank

vocational education problems in that State by securing nominations and ratings from a research project advisory committee, State vocational supervisors, and the vocational and practical arts teacher training staff at the University of Michigan. Thirty-seven problems were accumulated and ranked.

Twenty-one of Michigan's vocational problems seem comparable to eleven of Minnesota's trade and technical problem areas. Table 9 gives the common problem areas.

Appendix B lists the sixteen Michigan problems for which Minnesota has no direct counterparts. In the opinion of the Michigan respondents, six of these problems rank in the first (upper) quartile of all problems in importance, two are in the second quartile, three are in the third quartile, and five are in the fourth (lowest) quartile.

The 1960 Pennsylvania study utilized eighty-five criteria for evaluating local programs of trade and industrial education as the major source list for problem statements. Sixty-eight local directors, principals, and trade and industrial coordinators (about 70% of the desired sample) rated these problems plus thirty-four additional (respondent suggested) problems. A rank order was ascertained.

Only the fourteen most important (of the total one hundred and nineteen) problems in Pennsylvania's trade and industrial program were reported; these have been compared with Minnesota's eighteen problem areas. Twelve of the fourteen problems correspond to eight of the Minnesota problem areas. These are shown in Table 9.

Appendix C lists the two Pennsylvania problems for which Minnesota has no direct counterparts; they fall into the first and third quartiles of the fourteen most significant Pennsylvania problems.

All but one (number 6) of the thirteen top-ranked Minnesota problem areas have been considered significant enough by Michigan and/or Pennsylvania to include in their rankings. Only one (number 12) of the five lowest ranked Minnesota problem areas has been considered sufficiently important (by Michigan) to be ranked at all.

Table 9.
COMMON PROBLEM AREAS IDENTIFIED BY STUDIES IN MINNESOTA, MICHIGAN, AND PENNSYLVANIA*

Minn. Problem Areas**	Mich. Problem Areas	Penna. Problem Areas
1	x	
2		x
3	x	
4		x
5	x	x
6		
7		
8		
9	x	x
10	x	x
11	x	
12	x	
13	x	
14	x	x
15		x
16		
17	x	
18	x	x

*An (x) indicates that the Minnesota problem area has also been identified by the other State.
**Problem areas are numbered as they are listed in Appendix A.

Question 4b. To what extent are the priorities assigned to common problem areas in each of the other studies in agreement with the priority found in this study?

Table 10 indicates that there are no statistically significant relationships between common problem areas, although there is a slight tendency for both Michigan and Pennsylvania to assign reverse priorities to those problem areas which each has in common with Minnesota.

Table 10.
CORRELATION COEFFICIENTS OF PRIORITY RANKINGS OF PROBLEM AREAS COMMON TO MINNESOTA AND MICHIGAN, AND TO MINNESOTA AND PENNSYLVANIA

	Michigan (n=11)	Pennsylvania (n=8)
Minnesota	−.22	−.39

IV. CONCLUSIONS

Any conclusions that may be drawn as a result of this study are necessarily restricted to the sample at the time the instrument was completed. The reader is, therefore, cautioned that the value of the conclusions is dependent upon, first, acceptance of the particular respondents as qualified judges who have provided honest, thoughtful opinions, and second, recognition that changes in conditions within the State might well alter the kind and/or priority of problems that exist. Within these limitations, it can be concluded that:

1. The questions listed in Appendix A reflect most of the current problem areas which appear to be significantly limiting the effectiveness of the trade and technical program in Minnesota. Researchable problems remain to be extracted from each of these areas.
2. Table 2 provides the best estimate of the order in which the identified trade and technical problem areas should be investigated. This conclusion assumes that the respondents are equally capable judges of the needs of trade and technical education, and that an arithmetic average of diverse individual opinions (in lieu of any consensus) is more valid than a single individual opinion.
3. Tables 4, 5, and 6 provide the best estimate of the order in which separate groups of area school administrators, trade and technical teacher trainers, and selected State Department personnel feel the problem areas should be studied.
4. There is little agreement within each of these separate groups of trade and technical educators as to preferred order. However, average opinions indicate that similarities and differences in the nature of the responsibilities of each group tend to be reflected in their choice of problem area priorities.
5. The problem areas identified for trade and technical education are relevant to the fields of agriculture, business, and distributive education, but not to home economics education. Based on a very limited sample, there is some reason to believe that the opinions of individuals in the first three mentioned fields are as disparate as those of the trade and technical educators, and that their average opinion agrees with the results reported in Table 2 as well as any of the groups within trade and technical education agree among themselves.
6. Michigan and Pennsylvania have also identified almost all of the problem areas which this study finds most important. Within these "common" problem areas, however, there is no appreciable relationship between the priorities assigned by this State and Michigan or Pennsylvania. Differences in the nature of the sample, time, conditions within each State, and the frame in which the opinion was requested may all contribute to a lack of relationship. It should also be noted that both Michigan and Pennsylvania have recognized problems for which Minnesota has no apparent counterparts.

V. IMPLICATIONS

1. It is inevitable that, in evaluating proposals submitted to the State for funding, some consideration be given to their immediate educational significance. The results of this study should contribute to this aspect of the total evaluation. But because individuals most intimately acquainted with the State's trade and technical program do not agree upon the most desirable priority in which to investigate problems, care must be taken not to weight immediate educational significance too heavily, or to use too fine a scale in its measurement.
2. If the type and relative importance of problems expressed by educational practitioners are directly affected by their perception of changing conditions, then it is necessary, especially in the rapidly evolving vocational program, to keep the list of problem priorities current if it is to maintain its usefulness.
3. In addition to the desirability of maintaining a current list of problems for research and administrative purposes, repetitive measures should reveal the "persistent" problems, and might also provide an opportunity to evaluate program progress, indirectly and subjectively, by utilizing change in perceived problems as a criterion.

APPENDIX A

PROBLEM AREAS IDENTIFIED BY MINNESOTA CONFEREES

(Shown in the order in which they were listed on the opinionnaire)

1. How can the high school years be best used to discharge public education's total responsibility for preparing students to enter the world of work?
2. What responsibility does vocational education have for providing curricula for the "low ability" student and the potential high school dropout? What can it do for those students?
3. What is the "image" of vocational and technical education in the minds of its publics (administrators, teachers, students, industry, labor, etc.)?
4. What techniques and procedures are most effective in improving the "image" of vocational and technical education?
5. How can we improve the techniques for identifying the occupations for which training should be provided?
6. For what operative (semi-skilled) occupations should the schools provide training? At what educational level(s)? How?
7. Are there occupations that require combination distributive-trade and industrial programs? How, when, and where might these be offered?
8. What specific occupations will emerge from the taconite industry?
9. How can we improve our methods for identifying and developing the curriculum and specific course content used to train for a given occupation?
10. What relative emphasis should be placed in preparatory vocational curricula on the attainment of specialized, immediately productive skills versus the development of abilities permitting greater breadth and flexibility in attaining long-range occupational goals?
11. What are the relative merits of the administrative structure and educational opportunities provided by (a) specialized and (b) comprehensive institutions (i.e. area vocational-technical schools vs. community colleges, vocational high schools vs. comprehensive high schools)?
12. What evidence can be secured illustrating the relative effectiveness of vocational vs. non-vocational programs (to show the personal and social benefits of vocational programs)?
13. What programs can be devised to recruit, select, and train vocational supervisors, coordinators, and directors?
14. How can we improve the recruitment, selection, training, and updating of vocational instructors?
15. How can we improve the efficiency and effectiveness of the classroom and shop teaching-learning situation (methods, class size, instructional materials, length of class periods, etc.)?
16. What is the extent of geographical mobility among youth and workers in the State?
17. What will be the statewide quantitative need for workers in each of the trade and industrial occupations by 1970? In what geographical areas will these needs be centered?
18. What are the objective measures which will predict student achievement and completion rate in our vocational curricula?

APPENDIX B

MICHIGAN PROBLEMS NOT DIRECTLY RELATED TO MINNESOTA PROBLEM AREAS

	Problem	Quartile Rank
1.	To determine the need for, and feasibility of area vocational schools in Michigan.	1
2.	To determine the essential services and organization of an effective vocational guidance program.	1
3.	To determine the organizational relationships of vocational education programs in community colleges and the high schools within their service areas.	1
4.	To determine the individuals or groups who make the decisions relative to the operation of vocational education at the local, state and national levels with particular emphasis at the local level.	1
5.	To determine the essential characteristics and organization of a program for retraining displaced adult workers.	1
6.	To make an opinion survey of local school administrators to determine the anticipated effect of a gradual withdrawal of special reimbursement on the high school program, on the teacher-education program, and on the post-high school programs.	1
7.	To appraise the research in vocational education to determine scope and quality.	2
8.	To catalogue the opinions of school and community leaders on ways of better utilization of community resources in cooperative occupational training, apprenticeship, work experience, and job-upgrading programs.	2
9.	To describe the organizational structure of vocational education in Michigan and the kinds of services rendered.	3
10.	To determine the structure, goals and activities of school, community, state and federal agencies concerned with vocational education and to show the interrelationships among them.	3
11.	To determine the extent to which lay advisory committees are being used and to assess the opinions of school and lay persons as to the value of lay advisory committees.	3
12.	To analyze the areas of responsibility of practical arts and of vocational education and to determine the administrative relationships between them.	4
13.	To determine the extent to which the Michigan Council for Vocational Education Administration is representative of those groups interested in and concerned with the administration of vocational education.	4
14.	To determine the quantity and quality of vocational education courses offered by correspondence schools.	4
15.	To analyze the programs and activities of selected professional organizations in Michigan to determine how effective they are in providing leadership in vocational education.	4
16.	To determine the existing administrative relationships between public and private technical education.	4

APPENDIX C

PENNSYLVANIA PROBLEMS* NOT DIRECTLY RELATED TO MINNESOTA PROBLEM AREAS

	Problem	Quartile Rank
1.	The identification and proper installation of safety devices for various trade areas.	1
2.	Methods of securing support for an adequate budget for a T. & I. program.	3

*Including only the top-ranked fourteen problems.